



OFFICE MEMORANDUM

DATE: August 18, 1997

TO: District Engineers
District Field Engineers
District Construction Engineers
Resident/Project Engineers
TSC Managers

FROM: James D. Culp
Engineer of Construction and Technology

SUBJECT: Construction and Technology Instructional Memorandum 1997-7
Progress Schedule Determinations/Critical Path Rates

Two previously issued Office Memorandums have had as subject matter the changes/revisions in the MDOT Plan Review Process. One is entitled "Changes in the MDOT Plan Review Process", dated June 18, 1997, from Gary D. Taylor and C. Thomas Maki. The other is entitled "Revised Plan Review Process", dated July 18, 1997, from Larry M. Felsing. Both of these memos indicate that the Resident Engineer will supply the Progress Schedule at the Omissions/Errors Check (OEC) Meeting. OEC Meetings will be scheduled in the near future for those projects to be let in October 1997.

To aid the Resident Engineers in preparing the Progress Schedule and determining the contract completion time/date, the following information is attached:

Attachment A:

"Critical Path Networks", indicates the types of projects where the Resident Engineer can expect that a critical path will be prepared in advance by the MDOT Project Manager. It also contains the production rates for major work items, which when multiplied by the work item quantities on a project determines the estimated time in work days to complete the item. It should be noted that preparation of a Critical Path is a requirement on all consultant-designed projects, regardless of the project type or complexity. The Resident Engineer should contact the Design Consultant Coordination Unit for the project's Critical Path if they do not receive it in advance of needing to prepare the Progress Schedule.

Attachment B:

"Work Day/Completion Date Determination", is a worksheet to be used for calculating the estimated time to complete major work items and arrive at the total work days/completion

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date for completion of all work items. This worksheet should remain on file at the Resident Office and become part of the permanently-retained project files for audit purposes.

Attachments C, D, and E:

They are examples of Progress Schedules for working day and/or calendar date projects. These formats should be used for all routine, non-expedited (i.e., 4 day work week) projects. For non-routine projects such as those requiring multiple staging and/or interim contract completion dates, incentive/disincentive clauses, and/or A+B contracting language, or for expedited (i.e., 5 day work week) projects, please contact the Lansing Construction Staff Engineer assigned to your District. They have examples of non-routine and/or expedited project Progress Schedules and can provide any necessary guidance.

Should you have questions related to the preparation of Progress Schedules on any project, the Lansing Construction Staff Engineers are available to assist you. They are intending to attend the first few OEC Meetings with the Resident Engineers also to help during this transition period.

attachments

JDC:MLL:hr

cc:	Lansing Construction and Technology Division Engineers	MRBA
	Lansing Construction and Technology Technicians	MAPA
	POST on bulletin board	MCPA
	Real Estate, M. Frierson	MCA
	C&T Division - Secondary Lab	MAA
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Subject Index: Progress Schedules

ATTACHMENT A

CRITICAL PATH NETWORKS

Critical Path Networks are often needed to develop the progress schedule for a project. They are required on any project designated to include an Incentive/Disincentive or Special Liquidated Damages clause. Critical Path Networks are also recommended for projects with the following characteristics:

1. New construction.
2. Major reconstruction or rehabilitation on an existing roadway that will severely disrupt traffic.
3. Unique or experimental work.
4. More than one construction season.
5. Complex staging(multiple stages with traffic shifts).

There may be projects that do not fall under the above characteristics which should have a Critical Path Network. The Project Manager should evaluate each project separately. Lansing Construction staff and the Project Engineer assigned to the project should be consulted when determining the need for, and, when developing a Critical Path Network.

CRITICAL PATH-CONSTRUCTION TIME ESTIMATES

Drainage

Cross Culverts

Rural Highways	40 m/day
Expressways	50 m/day
Large Headwalls	5 days/unit
Slab or Box Culverts	5 days/pour
Plowed in Edge Drain(production type project)	4500 m/day
Open Graded Underdrain(production type project)	1200 m/day

Sewers

0m-5m(up to 1500mm)	40 m/day
0m-5m(over 1500mm)	25 m/day
5m-over(up to 1500mm)	25 m/day
5m-over(over 1500mm)	20 m/day
Jacked-in-place	13 m/day
including excavation pit & set up	min. 5 days
Tunnels	
hand mining	8 m/day
machine mining	20 m/day
including excavation pit & set up	min. 5 days

Manholes

3 units/day

Catch Basin

4 units/day

Utilities

Water Main(up to 400mm)	100 m/day
Flushing, Testing & Chlorination	4 days
Water Main(500mm-1050mm)	25 m/day
Flushing, Testing & Chlorination	5 days
Order & Deliver 600 mm HP Water Main	50 days/order
Gas Lines	100 m/day

Earthwork and Grading

	Metro Exp	Rural
Embankment(CIP)	1500 m3/day	5300 m3/day
Excavation and/or Embankment(Freeway)	1500 m3/day	9200 m3/day
Excavation and/or Embankment(Reconstruction)	750 m3/day	3800 m3/day
Embankment(Lightweight Fill)	300 m3/day	600 m3/day
Muck(Excavated Waste & Backfill)		1500 m3/day
Excavation(Widening)		600 m/day
Grading(G & DS)		750m/day
Subbase and Selected Subbase(up to 7.4m)		600 m/day
Subbase and Selected Subbase(7.4 m & over)		450 m/day
Subgrade Undercut & Backfill		1500 m3/day
Subbase & Open-Graded Drainage Course		450 m/day

Surfacing

Concrete Pavement(7.3m)	450 m/day
Including Forming & Curing	min. 7 days
Bituminous Pavement(7.3m)	1200 m/day/course
Concrete Ramps(4.9m)	300 m/day
Including Forming & Curing	min. 7 days
Curb(1 side)	750 m/day
Concrete Shoulder-Median	1200 m2/day
Bituminous Shoulders(1 side per course)	750 m/day
Sidewalk	180 m2/day
Sidewalk(Patching)	65 m2/day

Structures

Sheeting(Shallow)	30 m/day
General Excavation at Bridge Site	750 m3/day
Excavation for Substructure(Footings)	1 unit/day
Piles(12m)	15 piles/day
Substructure(Piers & Abutments)	5 days/unit
Order and Delivery of Beams	
Plate Girders	100-120 days/order
Rolled Beams	90-120 days/order

Concrete Beams	50 days/order
Erection of Structural Steel	3 days/span
Bridge Decks	
Form & Place Reinforcement(60m Structure)	15 days
Pour Deck Slab(1 1/5 days/pour)	2 days/span
Cure	14 days
2 Course Bridge Decks	
Add 9 days for Second Course Latex	
Add 12 days for Second Course Low Slump	
Sidewalks and Railings	
Sidewalks and Parapets	5 days/span
Slip Formed Barriers	2 days/span
Clean Up	10 days
Pedestrian Fencing	
Shop Plan Approval & Fabrication	1-2 months
Erection	1 week/bridge
Rip Rap Placement	
Bucket Dumped	385 m ³ /day
Bucket Dumped and Hand Finished	131-523 m ³ /day
Retaining Walls	1 Panel/day min. 10 days
Railroad Structures	
Grade Temporary Runaround	750 m ³ /day
Ballast, Ties & Track	50 m/day
Place Deck Plates	5 days/span
Waterproof, Shotcrete & Mastic	5 days/span
Railroad Crossing Reconstruction	10-15 work days (depends on if concrete base is involved)
Temporary Railroad Structures	
Order & Deliver Steel	55 days/order
Erect Steel	1 day/span
Ties and Track	3 days/span

Pumphouse

Structure	30 days/m
Order & Deliver Electrical & Mechanical Equipment	90 days
Install Electrical & Mechanical Equipment	30 days

Miscellaneous

Removing Old Pavement	60 m/day
Removing Old Pavement for Recycling(7.3m)	450 m/day
Crushing Old Concrete for 6A or OGDC	1350 mtons/day
Removing Trees(Urban)	15 units/day
Removing Trees(Rural)	30 units/day
Removing Concrete Pavement	450 m ² /day
Removing Sidewalk	250 m ² /day
Removing Curb & Gutter	450 m/day
Removing Bitumin.ous Surface	1600 m ² /day
Conditioning Aggregate	900 m/day
Bitumin.ous Base Stabilizing	2500 m ² /day
Ditching	600 m/day
Trenching for Shoulders	750 m/day
Station Grading	610 m/day
Clearing	8000 m ² /day
Restoration(Topsoil, Seeding, Fertilizer & Mulch)	1650 m ² /day
Sodding	2100 m ² /day
Seeding	40000 m ² /day
Guard Rail	230 m/day
Fence(Woven Wire)	360 m/day
Fence(Chain Link)	150 m/day
Clean Up	600 m/day
Concrete Median Barrier	300 m/day
Cure	min. 7 days
Reroute Traffic(Add 4 days if 1st item)	1 day/move
Concrete Glare Screen	450 m/day
Light Foundations	6 units/day
Order & Delivery	6-8 week/order
Remove Railing & Replace with Barrier(1 or 2 decks at a time)	4 days/side
Longitudinal Joint Repair	1600 m/day
Crack Sealing	4800 m/day
Joint and Crack Sealing	500 m/day
Repairing Pavement Joints - Detail 7 or 8	200 m/day
Seal Coat	6400 lane m/day
Diamond Grinding/Profile Texturing Concrete	3300 m ² /day

Rest Area Building	
Order Material	3 months
Construct Building	9 months
Tower Lights	
Order and Deliver Towers	100 days
Weigh-In-Motion	
Order and Deliver Materials	1 month-6weeks
O & D with Installation	3 months
Raised Pavement Markers	300 each/day
Attenuators	2 each/day
Shoulder Corrugations, Ground or Cut	8 km-9.7 km/side/day
Aggregate Base	2900 m ² /day
Aggregate Shoulders	350 m ³ /day
Freeway Signing - 3# Post Type	50 signs/day
Concrete Joint Repair (High Production-Projects with > 1000 patches)	
Average(1.8m)	50 patches/day
Large(>1.8m)	500 m ² /day
Bridge Painting	90 m ² /day
Pin and Hanger Replacement	3 beams/day
Order Pin & Hanger	60 days
Bridge Repair	
Scarifying(Including Clean up)	10000 m ² /day
Joint Removal(Including Clean up)	4 m/day
Forming & Placement	3.5 m/day
Hydro-Demolishing	300 m/day
Barrier Removal	15 m/day
Placement	45 m/day
Hand Chipping (Other than Deck)	.24 m ³ /person/day
Shoulder Corrugations, Ground or Cut	8 km-9.7 km/side/day
Casting Latex Overlay	250 m/day
Curing Overlay	
Regular	4 days
High Early	1 day
Thrie Beam Retrofit	30 m/day
Beam End Repairs	
Welded Repairs	.75 days/repair
Bolted Repairs	.50 days/repair
Bolted Stiffeners (Pair)	.25 days/repair
Grind Beam Ends	.25 days/repair

Welded Stiffeners (Pair)	.25 days/repair	HP steel
Repairs:		
Welded Repair	.50 days/each	
Replacement	1 day/each	
Deck Removal	235 m ² /day	

Surfacing-Bituminous

Metro-Primary(<18000mtons)

Paving	540 mtons/day
Joints	150 m/day
Cold Milling	3400 m ² /day
Aggregate Shoulders	900 mtons/day

Metro Primary(>18000mtons)

Paving	540 mtons/day
Joints	200 m/day
Cold Milling	7500 m ² /day

Metro Interstate(>18000mtons)

Paving	1100 mtons/day
Joints	360 m/day
Aggregate Shoulders	900 mtons/day

Urban Primary(<18000mtons)

Paving	640 mtons/day
Joints	100 m/day
Cold Milling	1700 m ² /day
Rubblizing	1700 m ² /day
Aggregate Shoulders	450 mtons/day

Urban Primary(>18000mtons)

Paving	1000 mtons/day
Joints	120 m/day
Cold Milling	1700 m ² /day
Aggregate Shoulders	500 mtons/day

Urban Interstate(>18000mtons)

Paving	1200 mtons/day
Joints	220 m/day
Cold Milling	1700 m ² /day
Rubblizing	5800 m ² /day
Aggregate Shoulders	640 mtons/day

Rural Primary(<18000mtons)

Paving	640 mtons/day
Joints	120 m/day
Cold Milling	590 mtons/day
Crush & Shape	10000 m ² /day
Aggregate Shoulders	640 mtons/day

Paving	1100 mtons/day
Joints	150 m/day
Cold Milling	800 mtons/day
Crush & Shape	10000 m2/day
<hr/>	
Rural Interstate(>18000mtons)	
Paving	1280 mtons/day
Joints	220 m/day

WORK DAY/COMPLETION DATE DETERMINATION

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[illegible]

TOTAL ESTIMATED TIME

CAL WORK

COMPLETION DATE - WORK DAYS

COMMENTS:

ATTACHMENT E

PROGRESS SCHEDULE: Start work within ten (10) days after receiving Notice of Award of contract or on or before the date designated as the starting date in the Detailed Progress Schedule. In no case, shall any work be commenced prior to receipt of formal notice of award by the department.

Staging Dates

Open to Traffic on or before

The entire project shall be completed on or before .

The low bidder(s) for the work covered by this proposal will be required to meet with Department representatives to work out a detailed progress schedule. The schedule for this meeting will be set after the low bidder is determined.

The named subcontractor(s) for Designated and/or Specialty Items, as shown in the proposal, is recommended to be at the scheduled meeting if such items materially affect the work schedule.

The District Engineer will arrange the time and place for the meeting.

~~The Progress Schedule shall include, as a minimum, the controlling work items for the completion of the project and the planned dates (or work day for a work day project) that these work items will be controlling operations. When specified in the Bidding proposal the date the project is to be opened to traffic as well as the final project completion date shall also be included in the project schedule.~~

If the Bidding Proposal specifies other controlling dates, these shall also be included in the Progress Schedule.

Failure on the part of the Contractor to carry out the provisions of the Progress Schedule, as established, may be considered sufficient cause to prevent bidding future projects until a satisfactory rate of progress is again established.

ATTACHMENT C

PROGRESS SCHEDULE: Start work within ten (10) days after receiving Notice of Award, or on the date agreed upon with the Engineer. In no case, shall any work be commenced prior to receipt of formal notice of award by the department.

This contract will be completed in ____ working days. Working days will be charged starting on the date that work is started, or date agreed, which ever is earlier.

The low bidder(s) for the work covered by this proposal will be required to meet with Department representatives to work out a detailed progress schedule. The schedule for this meeting will be set within one week after the low bidder is determined.

The named subcontractor(s) for Designated and/or Specialty Items, as shown in the proposal, is recommended to be at the scheduled meeting if such items materially affect the work schedule.

The District Engineer will arrange the time and place for the meeting.

The Progress Schedule shall include, as a minimum, the controlling work items for the completion of the project and the planned dates (or work day for a work day project) that these work items will be controlling operations. When specified in the Bidding proposal the date the project is to be opened to traffic as well as the final project completion date shall also be included in the project schedule.

If the Bidding Proposal specified other controlling dates, these shall also be included in the Progress Schedule.

Failure on the part of the Contractor to carry out the provisions of the Progress Schedule, as established, may be considered sufficient cause to prevent bidding future projects until a satisfactory rate of progress is again established.

ATTACHMENT D

PROGRESS SCHEDULE: After receiving Notice of Award, start work on the date agreed upon with the Engineer, which date shall be no later than _____. In no case, shall any work be commenced prior to receipt of formal notice of award by the department.

This contract will be completed in _____ working days. Working days will be charged starting on the date that work is started, or on _____ whichever is earlier.

The low bidder(s) for the work covered by this proposal will be required to meet with Department representatives to work out a detailed progress schedule. The schedule for this meeting will be set within one week after the low bidder is determined.

The named subcontractor(s) for Designated and/or Specialty Items, as shown in the proposal, is recommended to be at the scheduled meeting if such items materially affect the work schedule.

The District Engineer will arrange the time and place for the meeting.

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